CALIFORNIA ENERGY COMMISSION

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Request for Information Natural Gas Research Program Solicitation Development October 7, 2015

Purpose of Request:

The purpose of this Request for Information (RFI) is to identify research needs to increase the energy efficiency of natural gas systems associated with water heating, heating, ventilation and air conditioning (HVAC) equipment and systems, controls and distribution systems, building envelope, and integrated systems in residential and commercial buildings. Recent legislation and state goals will require that buildings substantially reduce energy use from current levels—by as much as 50 percent¹ in existing buildings and be zero net energy by 2020 for new residential construction. Identifying research needs associated with advancing technologies, addressing barriers, and developing strategies will be key to achieving these reductions. California homes and businesses consume approximately 31 percent of natural gas.² Responses received to this RFI will be used to guide the development of the next solicitation.

Respondents are asked to comment on one or more of the following questions:

Water Heating

- Solar Water Heating
 - What research is needed in developing advanced, cost-efficient solar water-heating systems and maximizing their penetration and deployment?
 - o Is there a need to develop designs and systems that emphasize use of low cost materials and increase performance?
 - o Is there a need for more demonstrations and large scale deployments to increase outreach and marketing and monitoring and verification of the technical and economic feasibility?
 - o For future zero net energy homes, are studies needed to compare the technical and economic feasibility of solar water heating versus electric heat pump water heaters that utilize photovoltaic systems by climate zone?
- □ Other Water Heating and Air Emissions

¹ Clean Energy and Pollution Reduction Act of 2015 (SB 350) http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB350 Based on 2013 data from the U.S. Energy Information Administration

http://www.eia.gov/dnav/ng/NG CONS SUM DCU SCA A.htm

- Is research needed to develop and demonstrate high-efficiency, costeffective, natural gas heat pump water heaters, such as systems that use absorber technology or direct gas-fired technology?
- AB 32 sets goals for reducing greenhouse gas emissions and local air districts have set limits for NOx emissions from water heating systems. What research is needed to develop, test and demonstrate new water heating technologies that can help meet these emission limits? Discuss whether research is needed to develop and test advanced, cost-effective hot water storage, tankless water heaters, or hybrid condensing water heaters that can reduce GHG and NOx emissions.

☐ Hot Water Distribution

- What research is needed to improve residential and commercial hot water distribution systems in both new and existing buildings that are technically feasible, cost effective and can reduce energy and water waste? Are there improvements that appear promising but lack data or are not well demonstrated?
- Is research needed to develop and demonstrate high-performance, economically feasible, and consumer-acceptable shower heads that would achieve flow rates lower than existing regulatory requirements?³
- Is research needed to determine the effects of low water flow on building plumbing and infrastructure?

Advanced HVAC & Building Envelopes

☐ HVAC Systems

- What research is needed to improve the energy efficiency and costeffectiveness of advanced HVAC systems that will have energy and water efficiency benefits? Examples include developing and demonstrating solar-thermal cooling systems (e.g. absorption chillers for the commercial sector and absorption heat pumps for the residential sector).
- Are there other HVAC system and control technologies that appear promising but lack data or are not well demonstrated? If so, what are some examples?
- What research is needed in developing and testing new, advanced HVAC systems that can help meet the state's GHG reduction goals and local emission limits for NOx?
- For future zero net energy homes, would it be beneficial to compare the technical and economic feasibility of various low carbon HVAC systems by climate zone?

☐ Distribution Systems and Building Envelope

 What research is needed to develop and demonstrate efficient, advanced and cost-effective air distribution design approaches that reduce energy

³ <u>http://www.energy.ca.gov/business_meetings/2015_packets/2015-08-12/Item 06/Item 6 Showerhead Staff Report 8-6-15.pdf</u>

- loss and waste in both new construction and existing buildings, and address occupant comfort and environmental issues?
- What research is needed to develop and demonstrate cost-effective and advanced building envelope materials that improve the R-value in existing residential and commercial building envelopes?

Integrated Natural Gas Systems

Is research needed to develop and demonstrate cost-effective integrated technologies, such as high-efficiency combined space and water heating
equipment or hybrid systems that perform both tasks as one unit? Is research
needed to evaluate the technical/economic feasibility of integrating such systems with solar water heating and solar HVAC technologies or integrate the "cooling side" of a heat pump water heater with space conditioning or other uses?
Is research needed to determine the technical and economic feasibility of operating appliances in a dual fuel mode (natural gas/biogas)? Include considerations such as infrastructure changes, appliance/equipment changes
and safety within buildings.
Is research needed to identify the interactive effects between natural gas and electric use in buildings, and the potential mitigation of increased natural gas consumption when electricity consumption is significantly reduced in zero net energy buildings?

Disadvantaged Communities

□ What research in water heating, HVAC, and integrated systems can best bring benefits to disadvantaged communities?

All responses should be clear and address the following:

- o Identification and explanation of the needed research area.
- o The project opportunities falling within the aforementioned research areas.
- A discussion of the benefits (e.g., energy savings, air emission reductions)
 which may be realized from inclusion of this research area.
- o A discussion on why funding is needed for this research area.
- Web links or references to document the need for funding or opportunities available, including publications, other funding solicitations, and other relevant documentation.

Respondents to this Request for Information should not include any proprietary, sensitive, or confidential information. This Request for Information will not consider the merits of individual projects or any requests for funding.

The Energy Commission will not pay for any information or administrative costs incurred in response to this RFI; all costs associated with responding to this RFI will be solely at the interested party's expense. There is not any preclusion to future participation for not responding to this RFI.

This RFI is only seeking information pertaining to the Natural Gas Research Program. As a result, all energy savings referenced must relate to reductions in natural gas consumption. For electricity projects, please refer to Electricity Program Investment Charge (EPIC) solicitation activities on the Energy Commission website.

How to Comment:

Comments should be submitted to Jeff Doll by 5 p.m. on Friday, October 23, 2015. Send comments to: jeffrey.doll@energy.ca.gov. Please include your name and the name of the organization you represent. Comments should be in a downloadable, searchable format such as Microsoft® Word (.doc/.docx) or Adobe® Acrobat® (.pdf) and limited to three pages. Please include the title of *Natural Gas Research Program Solicitation Development in Residential and Commercial Buildings* in the subject line.

Natural Gas Research Program Background:

Legislation was enacted in 2000 with Assembly Bill 1002 (Wright, Chapter 932, Statutes of 2000), which required the California Public Utilities Commission to impose a surcharge on all natural gas consumed in California to fund various energy efficiency programs, as well as public interest research and development to benefit natural gas ratepayers. Assembly Bill 1002 also required the California Public Utilities Commission to designate an entity to administer the research component of AB 1002.

In 2004, the California Public Utilities Commission issued Decision 04-08-010, which designated the Energy Commission as the administrator for the research funds. The Energy Commission manages these funds through its Natural Gas Research Program. In fiscal year 2014-2015, the California Energy Commission administered \$24 million for natural gas research, development, and demonstration projects through the Natural Gas Research Program. Each year, the Energy Research and Development Division develops and submits a budget plan to the California Public Utilities Commission to identify the research initiatives to be funded in the succeeding fiscal year. Once approved, the Energy Commission will grant funds to public and private entities to conduct research and development projects on the identified initiatives.